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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/733,097
Filing Date: December 10, 2003
Appellant(s): BEDELL ET AL.

Dominic M. Kotab
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed October 16, 2006, appealing from the Office action mailed May 15, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

Substantially agree. A copy of appealed claims 1-14, and 36 appears on pages 16-22, of the Appendix to the appellant's brief. Note that only independent claims 1, and 36 are on appeal. Also note that all claims have been included in the appendix and claims 15-28, are allowed.

(8) Evidence Relied Upon

20010005741	Breyta et al.	06-2001
5,017,271	Whewell et al.	05-1991
6,866,987	Lee	03-2005
6,218,056	Pinarbasi et al.	04-2001
5,006,202	Hawkins et al.	04-1991

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

I) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

II) Claims 1-14, and 36, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2001/0005741 (Breyta et al., herein after

referred to as Breyta) in view of U. S. Patent No. 5,017,271 (Whewell et al., hereinafter referred to as Whewell).

Breyta, in [0008], [0009], [0010], [0011], [0071], and in figures 5-8, discloses a method of forming a metal layer on the substrate by coating the substrate with a release layer (barrier layer) that comprises a polyphenolic polymer with repeating monomeric units and having the formula recited in claims 1, and 15, and is antireflective; coating the adhesive layer (release layer) with a top imaging layer (top layer) of photoresist material; exposing the photoresist layer through a mask; removing a portion of the top imaging layer so as to form an exposed portion of the barrier layer (adhesive layer), removing the exposed portion of the barrier layer (see figures 5-6) as a result of which an undercut is formed under the top imaging layer; and depositing a metal layer onto the exposed portion of the substrate (claims 1, 7-8, and 13-14). Breyta, in [0010], [0012], discloses that the substrate includes a seed layer (adhesion promoter layer), the release layer being formed on the adhesion promoter layer (seed layer) (claim 2). Breyta, in [0015], and [0016], discloses that the release layer composition may comprise 100% of polyphenolic polymer (claim 3). Breyta, in [0073], discloses that the release layer (monolayer, reference 2 of figure 1) (barrier layer) was spin coated on to the substrate (claims 4-5). Breyta, in [0013], discloses that only one of R_1, R_2, R_3, R_4, and R_5 is a hydroxyl group (claim 6).

The difference between the claims and Breyta is that Breyta does not disclose that the material is formed on the exposed portion of the substrate by plating.

Whewell, in col 6, lines 39-47, discloses plating the exposed portion of the substrate with a material layer.

Therefore, it would be obvious to a skilled artisan to modify Breyta by replacing the sputtering process with a plating process as suggested by Whewell because Whewell, in col 4, lines 46-59, discloses that the metal layer can be either electroplated or sputtered onto the exposed portion of the substrate, and Whewell, in col 5, lines 35-39, discloses that the preferred method of depositing the material layer onto the exposed portion of the substrate is plating because it is less expensive and less time consuming than sputtering.

III) Claims 9-11, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2001/0005741 (Breyta et al., herein after referred to as Breyta) in view of U. S. Patent No. 5,017,271 (Whewell et al., hereinafter referred to as Whewell) as applied to 1-8, 13-22, and 27-28, and further in view of U. S. Patent No. 6,866,987 (Lee).

Breyta in view of Whewell is discussed in paragraph no. II).

The difference between the claims and Breyta in view of Whewell is that Breyta in view of Whewell does not disclose that the developer does not remove the exposed portion of the barrier layer (claim 9). Breyta in view of Whewell does not disclose that the barrier layer is removed by reactive ion etching (claim 10). Breyta in view of Whewell does not disclose that the barrier layer is removed by milling (claim 11).

Lee, in col 3, lines 42-57, and in col 4, lines 9-15, discloses that the exposed

portions of the barrier layer (layer beneath the imaging photoresist layer, under layer resist) is not removed by the developer, and that the exposed portion of the under layer resist (barrier layer) can be removed by milling or RIE using the top layer photoresist as the mask.

Therefore, it would be obvious to a skilled artisan to modify Breyta in view of Whewell by employing the etching methods suggested by Lee because Lee, in col 3, lines 55-64, and in col 4, lines 10-15, discloses that the exposed layer of resist beneath the top layer resist can either be developed or milled or etched (RIE) such that etching occurs only in the direction normal or near normal to the substrate surface resulting in a controlled undercut.

IV) Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2001/0005741 (Breyta et al., herein after referred to as Breyta) in view of U. S. Patent No. 5,017,271 (Whewell et al., hereinafter referred to as Whewell) as applied to claims 1-8, 13-22, and 27-28 above, and further in view of U. S. Patent No. 6,218,056 (Pinarbasi et al., hereinafter referred to as Pinarbasi).

Breyta in view of Whewell is discussed in paragraph no. II).

The difference between the claims and Breyta in view of Whewell is that Breyta in view of Whewell does not disclose that removing the exposed portion of the barrier layer does not create undercuts under the photoresist (claim 12).

Pinarbasi, in col 6, lines 38-54, discloses that the release layer (beneath the photoresist layer mask) is exposed, for removal, to the e-beam and is scissioned and not necessarily undercut (see figures 10, and 11).

Therefore, it would be obvious to a skilled artisan to modify Breyta in view of Whewell by employing the etching methods suggested by Pinarbasi because Pinarbasi, in col 6, lines 55-67, in col 7, lines 1-7, discloses that exposing the release layer to e-beam results in the use of weak developers that can be developer-controlled so as to precisely define, and control the height and the length of the undercuts formed in the release layer under the top photoresist layer.

V) Claim 36, is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent Application Publication No. 2001/0005741 (Breyta et al., herein after referred to as Breyta) in view of U. S. Patent No. 5,017,271 (Whewell et al., hereinafter referred to as Whewell) and U. S. Patent No. 5,006,202 (Hawkins et al., hereinafter referred to an Hawkins).

Breyta, in [0008], [0009], [0010], [0011], [0071], and in figures 5-8, discloses a method of forming a metal layer on the substrate by coating the substrate with a release layer (barrier layer) that comprises a polyphenolic polymer with repeating monomeric units and having the formula recited in claim 36, and is antireflective; coating the adhesive layer (release layer) with a top imaging layer (top layer) of photoresist material; exposing the photoresist layer through a mask; removing a portion of the top imaging layer so as to form an exposed portion of the barrier layer (adhesive layer), removing the exposed portion of the barrier layer (see figures 5-6) as a result of which an undercut is formed under the top imaging layer; and depositing a metal layer onto the exposed portion of the substrate (claim 36).

The difference between the claims and Breyta is that Breyta does not disclose that the material is formed on the exposed portion of the substrate by plating. Breyta does not disclose that the barrier layer prevents cracks in the photoresist from transferring through the barrier layer and exposing portions of the substrate.

Whewell, in col 6, lines 39-47, discloses plating the exposed portion of the substrate with a material layer.

The difference between Breyta in view of Whewell is that Breyta in view of Whewell does not disclose a barrier layer that prevents cracks in the photoresist from transferring through the barrier layer and exposing portions of the substrate.

Hawkins, in col 3, lines 14-35, discloses that the substrate (SiO_2) is protected by the first protective layer (barrier layer) from the mechanical damage caused by the cracks produced in the photoresist layer.

Therefore, it would be obvious to a skilled artisan to modify Breyta by replacing the sputtering process with a plating process as suggested by Whewell because Whewell, in col 4, lines 46-59, discloses that the metal layer can be either electroplated or sputtered onto the exposed portion of the substrate, and Whewell, in col 5, lines 35-39, discloses that the preferred method of depositing the material layer onto the exposed portion of the substrate is plating because it is less expensive and less time consuming than sputtering. It would be obvious to a skilled artisan to modify Breyta in view of Whewell by using the protective film layer to prevent the transfer of the cracks in the photoresist layer to the underlying substrate as taught by Hawkins, because Breyta uses a barrier layer under the photoresist layer, and Hawkins, in col 2, lines 60-66,

discloses that the protective film layer protects the wafer and prevents the transfer of cracks created in the mask and thereby prevents unintentional etching on the wafer.

(10) Response to Argument

Issue #1

Group #1: Claims 1-8, 13-14

A) Appellant argues that there is no motivation to combine the teachings of Breyta with Whewell and that Whewell teaches away from plating using an underlayer.

Whewell is relied upon to teach the deposition of the material on the exposed portion of the substrate using plating techniques, and does not teach away from plating. Whewell, in col 6, lines 39-46, teaches plating the exposed portions or uncovered portions of the chromium, with a conductive material through the photoresist opening. Additionally, one skilled in the art would be motivated to combine Breyta's teachings with Whewell because Breyta teaches sputtering the material onto the exposed portions, and Whewell teaches in col 4, lines 46-59, that electroplating and sputtering deposition techniques are interchangeable, and Whewell, in col 5, lines 35-39, teaches that electroplating deposition techniques are generally less expensive than the alternative techniques such as sputtering. Also, the argument i.e., plating using an underlayer, is not a feature recited in the rejected claims.

B) Appellant argues that Whewell teaches away from coating a substrate with a barrier layer and coating the barrier layer with a top layer of photoresist.

Whewell is not relied upon to disclose the substrate with the barrier layer, and a top coating comprising a photoresist layer. Whewell is relied upon to disclose the interchangeability of the plating and sputtering deposition techniques. However, Whewell, in col 6, lines 389-46, does disclose a substrate coated with an underlayer such as chromium (a barrier layer), and forming a top imaging photoresist layer on the chromium layer. Furthermore, Breyta is relied upon to disclose coating a barrier layer (i.e., a release layer or adhesive layer) on the substrate, and coating a top imaging layer of photoresist material on the adhesive layer.

C) Appellant argues that Whewell eliminates the need for a pre-treatment of the metallic surfaces prior to the application of the photoresist, and that it is undesirable.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., pre-treatment of the metallic surfaces prior to the application of the photoresist) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

D) Appellant argues that Whewell teaches away from plating and from masking processes using an underlayer and undercut.

Whewell teaches the use of plating techniques to perform deposition through the exposed portions of photoresist pattern and onto the exposed surface of the chromium

layer. Whewell is not relied upon to teach masking processes, or forming undercuts or forming underlayers. Whewell does not teach away from plating, and masking processes using an underlayer and undercut, and Whewell, in col 2, lines 38-50 teaches that electroplating techniques are necessary in overly undercut photoresist patterns.

Issue # 2:

Group # 1: Claim 9

Appellant argues that Lee does not teach or suggest that the underlayer remains after radiation and development.

Lee teaches that the underlayer remains after the exposure and development, and in col 3, lines 42-56, discloses an underlayer (illustrated as reference 25 of figures 2, and 4) and a top photoresist layer (illustrated as reference 12 of figures 2, and 4), and that after exposure to radiation (radiation treatment) and development (see figure 2) a pattern is formed i.e., underlayer pattern is left behind after radiation and development (see figure 2).

Group # 2: Claims 10-11

Appellant argues that Lee does not teach that the underlayer is removed by milling or etching.

Lee, in col 3, lines 54-56, and in col 4, lines 10-15, and in figure 4, discloses that the remaining portions of the underlayer (reference 25 of figure 2 is subjected to etching to form the result illustrated in figure 4, i.e., removing the underlayer from beneath the

top layer) is removed using an etching process and that the etching methods employed includes RIE (reactive ion etching) or milling.

Issue #3:

Group #1: Claim 12

Appellant argues that Pinarbasi does not disclose that no undercuts are created.

Pinarbasi, in col 6, lines 38-54, and in figures 10, and 11, discloses the etch process to remove the exposed portions of the barrier layer (release layer), and illustrates the exposure of the release layer (exposed portions only) to e-beams (e-beams etch portions that are exposed) without causing an undercut portion in the release layer.

Issue #4:

Group #1: Claim 36

Appellant argues that Hawkins uses two layers under the photoresist, instead of a protective layer that protects the substrate.

Breyta is relied upon to teach a barrier layer that is formed on the substrate. Hawkins is relied upon to teach the formation of a first protective layer under the photoresist layer and on the substrate (thermal oxide substrate) and functions as the barrier layer to the substrate because Hawkins, in col 3, lines 28-36, discloses that the first protective layer prevents any mechanical damages to the substrate from cracks that occur during the photoresist patterning process.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Daborah Chacko-Davis

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